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Rezo, Natsvlishvili; Kochiashvili, Ia; Nino, Kochiashvili

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NEW FLARE STARS AND FLARES OF THE KNOWN ONES IN ORION

NATSVLISHVILI, REZO¹; KOCHIASHVILI, IA^{1,2}; KOCHIASHVILI, NINO¹

¹ Eugene Kharadze Abastumani Astrophysical Observatory, Ilia State University, Kakutsa Cholokashvili Ave 3/5, Tbilisi 0162, Georgia

² Dark Cosmology Centre, Niels Bohr Institute, University of Copenhagen, Juliane Maries Vej 30, DK-2100 Copenhagen Ø, Denmark

Observations of red dwarf flare stars were initiated in the Abastumani Astrophysical Observatory in 1969 (Kiladze, 1972). Regions rich in red dwarf stars were selected: the area around Orion Trapezium, and the stellar cluster of Pleiades have been chosen to ensure efficiency of observations. The objective of the investigation was to establish the character of time distribution of flares and to study the flare mechanism in red dwarf stars.

Observations were obtained with photographic method using photo-plates of Kodak and ORWO, on the wide-field (circular field with diameter of 4°50′) Maksutov system 70/100/210 cm Meniscus-type telescope of the Abastumani observatory by means of multiple exposure method.

Observational data containing information about flare stars and their flares obtained after processing photographic observations in 1969-1986 around Orion Trapezium has been published in the cumulative catalogue of flare stars in the Orion region (Natsvlishvili, 1991), where complete information about known (for that period) 490 flare stars and their 654 flares included. Out of these, 125 new flare stars and 182 flares of known flare stars were fixed in the Abastumani Astrophysical Observatory. Star AB461=TZ Ori turned out to be a short-period Cepheid (Natsvlishvili, 1994). After the publication of this catalogue new photographic material was obtained using the same methodology. On the basis of the new observations, data about newly revealed flare stars and the flares from known flare stars are presented in this article. This material, that was obtained in quite separate time interval, could be used for investigation of possible cyclic nature of the flare activity of red dwarf stars.

Estimations of photometric parameters of flare stars in normal conditions and the ones of flares were made using the sequence of the photometric standard stars (Andrews, 1970) existing in the Orion Trapezium area.

As a result of reexamining the 1989-1998 astrophotographic plates for the Orion Nebula Region, 12 new flare stars and 7 flares for known flare stars around Orion Trapezium have been revealed. For the new flare stars, the Abastumani numbering (AB) has been extended (Natsvlishvili, 1984). Flare parameters for the new flare stars are given in Table 1. In Table 2 parameters of the repeated flares are presented; numbering for these objects in the table are given according to “A Catalog of Flare Stars in Orion Nebula

Region” (Natsvlshvili, 1991). The identification charts of the newly detected flare stars are presented in Figure 1. The flare stars numbered AB146, AB148, AB149 and AB152 in Table 1 are known Orion variables: V1426 Ori, V1485 Ori, NW Ori and OU Ori, respectively. Flare star AB151 represents the microwave radio source JCMTSEJ053540.0-060838 (Di Francesco et al., 2008).

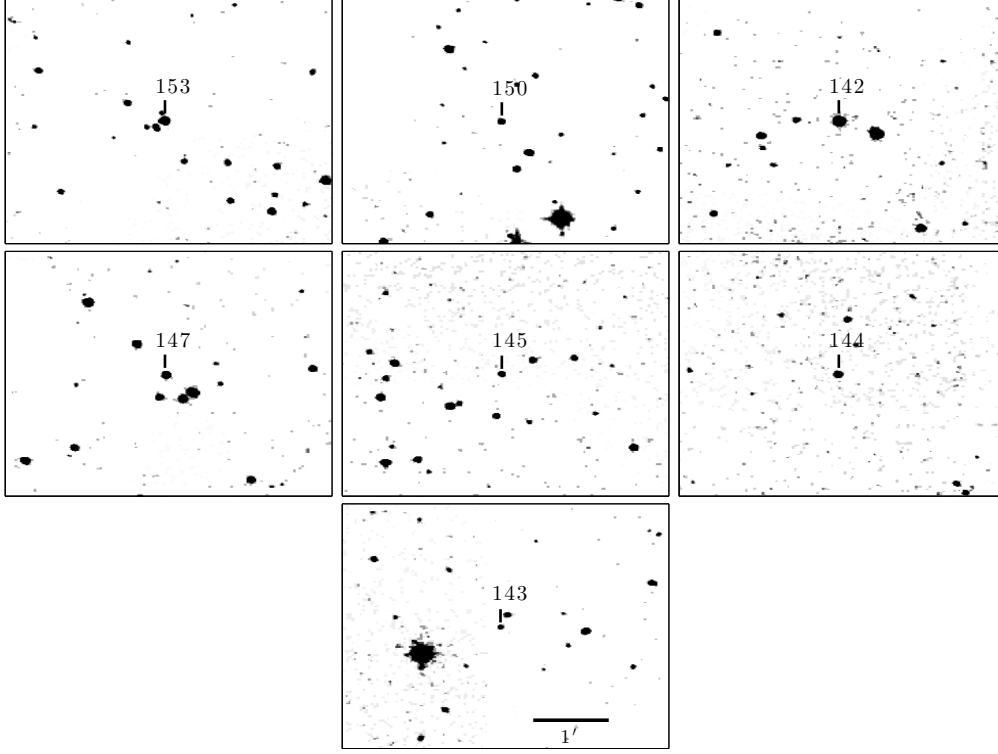


Figure 1. Identification charts for new the flare stars.

Table 1: New flare stars in Orion

| # | RA(2000) | DEC(2000) | m_{pg} | Δm_{pg} | Date |
|-------|---|--------------|--------------------|-------------------|------------|
| AB142 | 05 ^h 29 ^m 25 ^s .19 | −04°30′44″.9 | 14 ^m .8 | 2 ^m .2 | 16.11.1996 |
| AB143 | 05 32 03.04 | −06 42 01.5 | 20.5 | 4.6 | 28.02.1998 |
| AB144 | 05 32 48.40 | −04 41 42.1 | 17.4 | 1.7 | 17.11.1996 |
| AB145 | 05 33 57.88 | −04 35 42.7 | 20.4 | 3.5 | 20.11.1996 |
| AB146 | 05 34 17.56 | −06 03 38.2 | 16.9 | 2.0 | 28.02.1998 |
| AB147 | 05 34 49.30 | −05 04 36.6 | 17.8 | 2.3 | 18.11.1996 |
| AB148 | 05 35 08.02 | −05 36 46.4 | 18.3 | 1.6 | 17.11.1996 |
| AB149 | 05 35 30.16 | −06 03 02.6 | 16.7 | 1.4 | 21.02.1993 |
| AB150 | 05 35 36.64 | −03 13 00.3 | 20.0 | 4.2 | 22.02.1993 |
| AB151 | 05 35 40.00 | −06 08 38.0 | 20.8 | 4.0 | 31.10.1995 |
| AB152 | 05 35 50.47 | −05 51 42.2 | 15.6 | 1.5 | 02.12.1997 |
| AB153 | 05 36 26.06 | −03 13 54.0 | 16.0 | 2.7 | 15.11.1996 |

Table 2: Repeated flares in Orion

| # | RA(2000) | DEC(2000) | m_{pg} | Δm_{pg} | Date |
|-------|---|--------------|--------------------|------------------------|------------|
| AB188 | 05 ^h 34 ^m 29 ^s .07 | −06°38′51″.8 | 16 ^m .2 | 1 ^m .3 | 16.11.1996 |
| AB209 | 05 34 41.46 | −05 47 56.1 | 16.1 | 1.1 | 02.03.1989 |
| AB222 | 05 34 47.52 | −05 46 30.2 | 16.5 | 1.2 | 31.10.1995 |
| AB273 | 05 35 25.11 | −06 47 56.6 | 14.7 | 0.8 | 26.03.1992 |
| AB363 | 05 36 20.56 | −07 05 31.8 | 16.8 | 3.1 | 15.11.1996 |
| AB386 | 05 36 40.69 | −06 52 04.5 | 17.3 | 1.7 | 18.12.1989 |
| AB401 | 05 36 59.80 | −05 23 40.9 | 16.0 | 2.2 | 27.03.1989 |

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